Factors influencing infection prevention self-care behaviors in patients with hematologic cancer after discharge

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ABSTRACT

Purpose: The purpose of this study is to investigate the conditions and influencing factors behind infection prevention self-care behaviors performed at home by hematologic cancer patients with a central venous catheter inserted before hospital discharge, and to identify additional external factors influencing these self-care behaviors.

Methods: This is a descriptive survey study conducted with 147 patients with hematologic cancer who were hospitalized and re-admitted to a university hospital in Korea. Infection prevention self-care behaviors, knowledge, and family support were measured using scales developed through a preliminary survey and validity testing.

Results: The score for infection prevention self-care behaviors was 3.67 ± 0.81 (out of 5), knowledge was 68.8 ± 18.2 (out of 100), and family support was 4.21 ± 2.14 (out of 7). Infection prevention self-care knowledge (β = 0.443, $p < 0.001$) and economic status (β = 2.102, $p = 0.05$) both had a significant effect on infection prevention self-care behaviors. The total explanatory power for infection prevention self-care behaviors by two variables was 37.1%.

Conclusions: Infection prevention self-care behaviors were found to be significantly affected by infection prevention self-care knowledge and economic status. Developing and applying effective educational programs to improve infection prevention self-care knowledge will increase self-care behaviors. Additionally, nursing interventions should assess patients' economic status, their performance of oral care and knowledge of central venous catheter management.

1. Introduction

Hematologic cancer is a malignant blood disease that occurs in the blood or lymphatic system. There are three main types of blood cancers: leukemia, lymphoma, and myeloma (American Society of Hematology, 2017). The long-term survival rate of patients with hematologic cancer has been improved by the development of chemotherapy and hematopoietic stem cell transplantation, but infection is still one of the major complications facing patients with hematologic cancer (Centers for Disease Control and Prevention [[CDC], 2017; Grundy and Ghazi, 2009). The primary treatment for hematologic cancer is chemotherapy and, as the neutropenia state continues for two weeks or longer due to the suppression of bone marrow after chemotherapy, the risk of infection is very high. In addition to treatment-related mortalities, patients with hematologic cancer are also at risk from the disease itself (Grundy and Ghazi, 2009; Vaughn et al., 2016).

In recent years, the number of patients who want to reduce the

length of hospital stay has increased. Hospitals have also been motivated to improve patient quality of life and reduce rising financial costs and unnecessary medical expenses. As a result, there has been an increase in the number of outpatient chemotherapy treatments in patients with cancer (Vaughn et al., 2016). Because of this early discharge, patients are more likely to experience neutropenia after chemotherapy while at home. Lack of continuous monitoring by medical personnel also increases the risk of complications from undetected infection (CDC, 2017; Park and Park, 2016). Additionally, since the use of a central venous catheter (CVC) for the safe administration of anti-cancer drugs has become more common, patients are increasingly being discharged from the hospital with a CVC. As such, the need for patient education on CVC management, including risks of infection and prevention, has also increased (Boersma and Schouten, 2010; Park, 2016).

Patients with hematologic cancer in Korea are given recommendations to stay at home after discharge, and encouraged to take preventive actions themselves. To this end, discharge education is given by

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oncology nurses. However, CVC management is too complicated and most medical staff members are overlooking effective infection prevention self-care after discharge (Park and Park, 2016). Infection management practices after discharge do depend on the self-care capabilities of the patient. Unfortunately, when unexpected symptoms related to infection occur after discharge, the patient may not be aware of the severity of the symptoms and this may cause the infection to become worse, even leading to death (CDC, 2011; Dodd and Miaskowski, 2000; Wilson, 2008).

Previous studies on self-care for infection prevention in patients with hematologic cancer have assessed the knowledge, self-care competence, family support, and quality of life of these patients (Song, 2008). Additionally, Woo (2008) explored factors influencing self-care performance among hospitalized patients. Predictors of general self-care behaviors in patients with hematologic malignancies included family support, self-care knowledge, and marital status (Woo, 2008). In people with progressive cancer who were receiving chemotherapy, family support was the main factor influencing self-care, quality of life, and coping skills (Bae, 2015). This suggests it is also necessary to understand the influence family support has on influencing proper self-care (Bae, 2015).

This study investigated infection prevention self-care behaviors with patients who received chemotherapy for hematologic cancer and were re-admitted after discharge. This study provides basic data for effective infection management after discharge of patients with hematologic cancer and can be used as self-care education data for infection prevention.

2. Participants and setting

The participants of this study were adults over 18 years of age who were re-admitted to hospital after initial chemotherapy in a hematologic cancer ward of a university hospital with 1800 beds located in a metropolitan city in Korea. The participants scored 0–2 points on the European Cooperative Oncology Group (ECOG) performance status and were conscious, communicative, and able to perform self-care (Oken et al., 1982). All patients were scheduled for hospitalization for chemotherapy after initial chemotherapy, and were discharged with a CVC. All procedures followed were in accordance with the ethical standards of the institutional review board, Gachon University Gil Medical Center IRB (GCIRB 2016–118). Informed consent was received from all patients prior to data collection.

3. Methods

3.1. Study design

This was a descriptive study with questionnaires to investigate infection prevention self-care behaviors, knowledge, and family support for the prevention of infection after discharge in patients with hematologic malignancy, and to identify the factors influencing self-care behaviors for infection prevention.

3.2. Data collection

The data collection period was from May to September 2016. The questionnaires were distributed to participants selected according to the selection criteria; those who agreed to participate in the research were asked to complete the questionnaire directly.

The number of required samples was calculated using G-Power 3.1 (Faul et al., 2007). When the parameters $\alpha = 0.05$, medium-sized effect size $f = 0.15$, power = 0.80, numbers of predictors = 16 were inserted for linear multiple regression, the minimum sample size required for this study was 143. Considering attrition, the questionnaire survey was conducted with 160 people. Of these, 147 (91.8%) responded, while 13 (8.2%) supplied inappropriate responses.

3.3. Instruments

3.3.1. Infection prevention self-care knowledge

The scale for the level of infection prevention self-care knowledge was developed by the researcher of this study. It was based on the infection prevention information developed by the CDC (2017) non-hospitalized chemotherapy patients and caregivers, which measures CVC self-management knowledge (Park, 2016), and an infection prevention self-care knowledge measurement tool for patients who receive chemotherapy (Park and Park, 2016). In the previous Park (2016) study, the content validity index (CVI) was 0.85 and the Kuder-Richardson Formula 20 (KR-20) was 0.76. For Park and Park (2016) study, CVI was 0.80 and the KR-20 was 0.78.

A total of 12 items were constructed and tested for CVI by two infection-management nurses, one infection physician, and one nursing professor. A pilot study was conducted with 12 nurses. The questionnaire consisted of 12 items, which included disease characteristics and route of infection transmission (two items), hand washing (one item), daily life of activity (two items), diet (two items), oral care (two items), and CVC management (three items). A higher score indicates a higher level of knowledge. A correct answer was assigned 1 point and an incorrect answer or "don't know" was assigned 0 points. The total score then was converted into a percentile. In this pilot study, the final CVI was 0.95 and the KR-20 was 0.65; the reliability of the study (KR-20) was 0.68.

3.3.2. Infection prevention self-care behaviors

The scale for evaluating the performance rate of infection prevention self-care behaviors was measured using five items related to hand washing, four items related to oral care, two items related to diet, and three items related to daily life activities, which included measures of infection prevention self-care behavior of patients with hematologic cancer (Song, 2008). The four items for management of central venous lines were developed by the researcher of this study based on the CDC's information for infection prevention activities at home for patients and caregivers (CDC, 2017) and the items used to survey the self-management behavior of a CVC (Park, 2016). In the previous Song (2008) study, the Cronbach's alpha coefficient was 0.83. Park (2016) study had a CVI of 0.85 and the Cronbach's alpha coefficient was 0.72.

A total of 18 items were constructed and tested for content validity (CVI) with two infection management nurses, one infection physician, and one nursing professor. Here, a score of 1 point means "no performance at all" and 5 points means "very good performance; " the higher the score, the higher the level of self-care behaviors. In a preliminary study with 12 nurses, the Cronbach's alpha coefficient was 0.83; in this study, the Cronbach's alpha coefficient was 0.90.

3.3.3. Family support

Family support is a part of social support and includes assisting family members who have a disability. To create the family support scale, this study used the four items from the family factors relating to family, friends, and significant others of the Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet et al., 1988). The instrument is a Likert-type 7-point scale ranging from 1 (very strongly disagree) to 7 points (very strongly agree), which means that the higher the score, the higher the perceived family support. The Cronbach's alpha coefficient was 0.82 in the pilot study of 12 nurses, and 0.98 in this study.

4. Data analysis

The collected data were analyzed using SPSS/WIN 21.0, and the main variables were confirmed to be normally distributed (Kolmogorov-Smirnov test). The general characteristics of the participants, infection prevention self-care knowledge, self-care behaviors, and family support were calculated using frequencies, percentages, means, and standard deviations. The reliability of the related variables